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strigillosa, subtus ad nervos nervulosoque brevissime sparseque setulosa, caeteris glabra. Calyx leviter furfuraceus vix hirtellus. (No. 2627).

MICONIA LASIOCALYX Cogn. sp. nov. (sect. *Amblyarrhena*). Ramis obtuse tetragonis, junioribus petiolis pedunculis foliisque subtus ad nervos brevissime denseque puberulis fere furfuraceis; foliis ovato-oblongis, breviuscule acuminatis, basi rotundatis, margine obscure denticulatis, breviter 7-plinerviis, supra brevissime subsparse adpresseque setulosis, subtus pilis brevissimis simplicibusque densiuscule puberulis; floribus 5-meris, sessilibus; calyce breviter denseque hirtello, dentibus brevissimis; antheris oblongis, apice biporosis; stigmate peltato.

Rami satis graciles, juniores cinereo-fusci. Petiolus satis gracilis, 2–3.5 cm. longus. Folia membranacea, subtus viridi-cinerea, 15–19 cm. longa, 6.5–8 cm. lata. Paniculae pyramidatae, circiter 1 dm. longae, ramis divaricatis. Calycis tubus campanulato-ovoideus, cinereus, 3 mm. longus. Petala late obovata, apice subtruncata, 1 mm. longa. Antherae 1 mm. longae. Stylus 3 mm. longus. Affinis *M. Costaricensis* Cogn. (No. 2344).

MICONIA VALIDA Cogn. sp. nov. (sect. *Cremanium*); ramis obtuse tetragonis, ad nodos non dilatatis vix compressis, junioribus petiolis foliisque subtus ad nervos pilis plumosis crispulis brevissimis dense tomentosis; foliis tenuiter membranaceis, ovato-oblongis, breviter acuminatis, basi rotundatis vel vix emarginatis, integerrimis, 5-nerviis, supra primum leviter furfuraceo-hirtellis praecipue ad nervos demum glabratis, subtus brevissime et densiuscule stellato-puberulis; floribus minutissimis, 5-meris, sessilibus; calyx ovoideo-campanulato, glabrato, distincte 5-dentato; antheris apice biporosis; stigmate peltato.

Rami robusti, cinereo-fulvi. Petiolus robustiusculus, 3–4 cm. longus. Folia supra laete viridia, subtus viridi-cinerea, 18–23 cm. longa, 8–11 cm. lata. Paniculae late pyramidatae, multiflorae, 7–8 cm. longae, ramis patulis, gracilibus, densiuscule breviterque hirtellis. Calyx fuscescens, 1.5 mm. longus. Petala suborbiculari-ovata, obtusa, leviter furfuracea, 0.6–0.7 mm. longa. Antherae vix 0.5 mm. longae. Stylus 2 mm. longus.—Species *M. plethoricae* Naud. proxima. (No. 2630.)

What is meant by Stem and Leaf.

BY EMILY L. GREGORY.

The difference between these two plant organs appears so evident that few persons would hesitate if asked to explain it. To the botanist, however, the subject is not so simple. This is illustrated by the following paragraph which occurs in a recent number of the *School Review*: "It is unfortunate from a morphological standpoint that these organs of the Bryophyta should be called stems and leaves * * * this terminology being handed down from a time when the true homologies of the sporophyte and gametophyte parts were not well known."

It would seem from this paragraph that, while the ordinary observer would not hesitate to describe the organs of the moss-plant as stem and leaf corresponding to those of higher plants, the morphologist would give a different interpretation to their meaning, and even carry this so far as to prefer that other names be given them.

This opinion, expressed by the author of the above paragraph, is shared by many morphologists of the present day, and especially by one of our leading botanists, Professor Goebel. He says in an article published several years ago in the third volume of Schenk's General Botany, in speaking of the development of the higher from the lower, from thallus to the stem and leaf. "The attainment of a higher form in the different plant-groups has taken place in a similar or analogous manner, though it is an independent process in each plant group." He then compares the parts or members of *Caulerpa*, which resemble stem and leaf, with similar members in certain forms in the higher groups of plants, with certain of the Phaeophyceae, Florideae, and with the liverworts, ferns and phanerogams. Of these again he says, "We cannot say that these members are homologous, for example, liverworts and ferns are undoubtedly nearly related, but the vegetative form of the foliose liverwort is not the homologue of the leafy stem of the fern, but of the other generation, which has the form of a thallus; that is, the attainment of a stem and leaf in the asexual generation of the fern plant may have come about entirely independent of any inherited tendency or connection with the liverwort, simply by a series of changes from a thallus up to a stem and leaf, just as we have seen in the sexual generation of the liverwort. Here there is a gradual adaptation of the plant to its surroundings, till from a thallus form comes finally that of stem and leaf. The endeavor to find out how the different organs or members of the higher plants have originated must not take the starting point that the different groups of plants form a continuous series from low to high, but, on the contrary, must start with the assumption that the origin of different organs must be sought separately in each large group of plants. For this reason it is very difficult to give a definition of leaf which will hold for every group, as the leaf of the liverwort is analogous to that of the fern and not homologous."

It is difficult to harmonize these statements of Goebel, for, on the one hand, he says the attainment of stem and leaf is an independent process in each large group of plants ; on the other, that it is difficult to give a definition of a leaf which will hold for every group, because these organs are not homologues throughout the different groups but only analogues. If their attainment has come about independently in each group, why does he expect to find them homologues, or what has the question of homology to do with the conception of stem and leaf?

The writer of the present article was puzzling over this question in the laboratory of Professor Schwendener in the summer of 1894, and on asking him to explain it received the following explanation of his idea of stem and leaf. He first said that he did not share Professor Goebel's opinion regarding the idea of stem and leaf, for he saw no connection whatever with the question of homology. He then explained about as follows:

Suppose we examine a system consisting of main stem and branches or shoots: We find first a main stem which we may name I. On this arises another which may be called II. It is somewhat different from the first, smaller and less complex; this number II bears on it another which we may call III, and so on. There is no need so far for another name; this might be a branched thallus or a branched stem, the branches being the same in general character as the first or main branch, only they diminish in rank according to their distance from the main stem, so numbers do just as well as words to describe them. But when we come to the little outgrowths that appear on these branches then we find the need of another word or name. They differ from the stem, but are all of the same grade or rank, whether they are found on number I or II, or any other rank of stem. They generally arise from the point of vegetation in acropetalous order and are lateral appendages of the mother organ. The stem must first be present, then comes the leaf. For this formation we must have a name, as we cannot consider it a stem of any grade or rank.

This may be still farther illustrated by the examination of a plant like *Nitella* or *Chara*. Here the main branch sends off side-branches which in turn develop other side-branches, but these differ in rank, the higher the number, or the farther its distance from the main stem, the smaller the branch. There is no difference in principle but only in rank, so there is no need for term leaf here. There is but one idea, the repetition of the main stem, but on a smaller scale.

This makes the idea of leaf and stem a fixed one which holds through all the different groups of plants. The fact that the *Blasia* thallus is not homologous with the leafy fern stem has nothing whatever to do with the idea of the leaf. This is entirely independent of phylogenetic considerations, has to do simply with the ontogenetic facts, consists either of stem and leaf, or thallus. According to Professor Schwendener also, the transition forms are not so distinct as Goebel makes them. As soon as a leaf-like organ appears, the mother organ is to be named stem; so in *Marchantia*, that which is ordinarily called thallus is really stem, as it is that member from which another member unlike itself originates.

This conception of the relation between leaf and stem not only obviates the difficulty to which Goebel refers in defining the word leaf, but agrees perfectly with the manner in which it is supposed to originate. Those who accept this view, therefore, find no inconsistency in retaining the word cormophyte, neither in the use of the terms stem and leaf as applied to the organs of the moss plant.

NEW YORK, June 1, 1896.

Botanical Notes.

CASSIA PROBOSCIDEA n. sp. Cassia sectioni Oncolobio pertinens, erecta, herbacea (?), glabra vel leviter glanduloso-pubescens. Foliola 4–5-juga, ovata, anguste acuta, marginibus ciliata, 1.5–3 cm. longa. Petiola basiglandulosa, glandulis hemisphericis, sessilibus.